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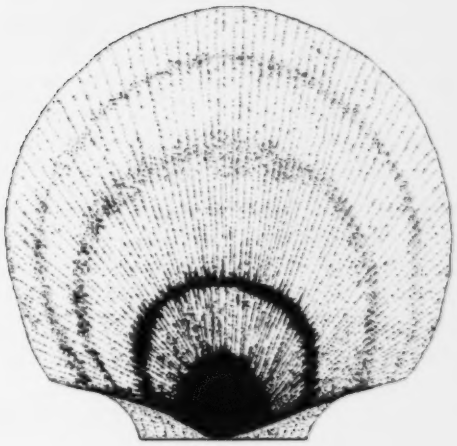
Maritimes Region
Canadian Science Advisory Secretariat
Science Advisory Report 2010/017

ASSESSMENT OF SCALLOPS (*PLACOPECTEN MAGELLANICUS*) IN SCALLOP PRODUCTION AREAS 1 TO 6 IN THE BAY OF FUNDY



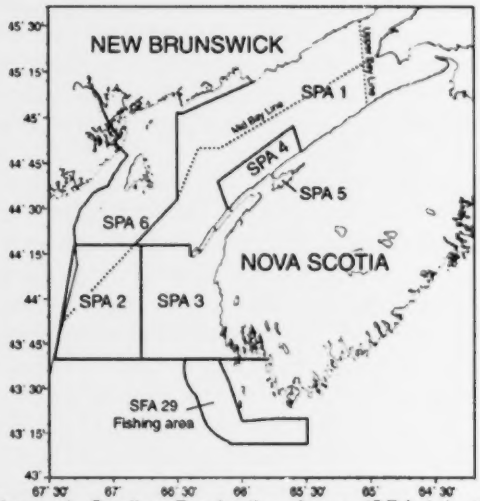


Figure 1. Scallop Production Areas (SPAs) in the Bay of Fundy. Refer to full detail map in Figure A1 for place names.

Context:

The Bay of Fundy area is fished by three scallop fleets: the Full Bay Fleet, the Mid Bay Fleet, and the Upper Bay Fleet. Full Bay vessels are 45' to 65' while Mid Bay and Upper Bay vessels are generally between 30' to 45'. Full Bay licensed vessels are permitted to fish throughout the Bay of Fundy. The Mid Bay license holders have access to all areas north of the Mid Bay line. The Upper Bay licence holders are restricted to the upper reaches of the bay. The fishery has been managed using limited entry, gear size limits, seasonal closures, minimum shell height, meat count, and individual meat weight restrictions. The gear width limit is 5.5 m with a ring size of not less than 82 mm inside diameter. Quotas were introduced in 1997. The Full Bay Fleet operates under an Individual Transferable Quota (ITQ) system while the Mid and Upper Fleets fish with competitive quotas. Total Allowable Catches (TACs) are set and landings are reported in terms of meat weights (adductor muscles).

Scallops in Scallop Production Areas (SPAs) 1 to 6 in the Bay of Fundy are assessed annually according to a framework conducted in 2002.

Canada

SUMMARY

General

- Biomass estimates for recent years from the 2009 versions of the population model were lower than estimated in previous years. It appears that this occurred because decreases in survey estimates from 2008 to 2009 were greater than the models can account for based on the reported catch and estimated natural mortality. A complete investigation of the models and the data inputs will need to be conducted before the next full assessment.
- Some observer coverage was funded by DFO's Species at Risk Program between August 2008-March 2009 for investigation of bycatch. No information from this program was available in time to be included in this assessment.

SPA 1A

- Landings were 267 t for the Full Bay Fleet during the 2008/2009 fishing year against a quota of 265 t. An interim TAC of 100 t was set for the 2009/2010 season based on the 2008 assessment advice. The average commercial catch rate in 2008/2009 changed little from that in 2007/2008 and was above the long-term median.
- Since the above average 1998 year-class recruited to the fishery in this area, recruitment has been lower and the abundance of commercial size scallops has been fished down. Recruitment is expected to be at very low levels for at least the next two years.
- Survey indices for abundance and biomass of commercial size scallops in 2009 declined from 2008 estimates by 23 and 28%, respectively.
- Population biomass, estimated to be 1,299 t (meats) in 2009, was close to the estimate for 2008 (1,307 t) and close to the median biomass of 1,295 t.
- Catches of less than 350 t for 2009/2010 should result in an increase in biomass for 2010. However, the model has a tendency to overestimate the abundance of commercial size scallop, and catches approaching this value may actually result in a decrease in biomass in 2010.

SPA 1B

- The total landings of all fleets in 2009/2009 were 388.7 t against a TAC of 385 t.
- Commercial catch rates for the Full Bay and Mid Bay fleets in 2009 changed little from 2008 in SFA 28B and SFA 28C, while Upper Bay and Full Bay fleet catch rates declined by 25 to 30%, respectively, in SFA 28D.
- The 2009 survey mean number and biomass per tow for commercial size scallops indicated declines for all areas from 2008, except for the Outer stratum of SFA 28D and Scots Bay. While most declines in biomass and numbers were on the order of 12 to 20%, survey mean number and biomass decreased by close to 50% in the Advocate stratum.
- Population biomass, estimated to be 1,703 t (meats) in 2009, has decreased from the estimate for 2008 (1,818 t) but is still above the median biomass of 1,672 t.
- Catches for 2009/2010 of 430 t or less should not result in a decline in biomass for 2010. However, the model has a tendency to overestimate the abundance of commercial size scallop, and catches approaching this value may actually result in a decrease in biomass in 2010.

SPA 2

- This area is considered to be marginal habitat for scallops and is not monitored regularly. SPA 2 was last assessed in 2006 (DFO 2007).

SPA 3

- Total landings for the 2008/2009 fishing year were 62 t against a TAC of 60 t. An interim TAC of 50 t was set for October of the 2009/2010 fishing season.
- Commercial catch rates have been stable and close to the median over the time series since 2007 while effort has been declining. However, fishing activity has been concentrated on the eastern nearshore areas, and the catch rates may not reflect conditions in SPA 3 as a whole.
- Survey estimates of mean numbers per tow of commercial size scallops have been declining since 2004 while mean biomass per tow has declined since 2007. This decline has occurred despite decreasing fishing effort and is evident in both fished areas and areas not fished since 2006. Recruitment is expected to be low for at least the next two years.
- Commercial catch rates have been stable over the last three years for current catch levels but may only reflect stock status in the eastern nearshore areas of SPA 3. The survey data has indicated declining trends even the areas that are not being fished. More work is required to reconcile these different trends.

SPA 4

- Total landings in 2008/2009 were 98.6 t against a TAC of 100 t. An interim TAC of 100 t was set for the 2009/2010 season based on last year's assessment.
- Commercial catch rates declined after the above average 1998 year-class recruited to the fishery but have been either relatively stable or slightly increasing since 2005/2006. The 2008/2009 catch rate is equal to the long-term median.
- Overall, the survey indices indicate that the population has been stable from 2006 to 2008 with low levels of recruitment, pre-recruits, and clappers. Survey estimates of commercial size mean numbers per tow and biomass per tow declined by 21 and 27%, respectively, in 2009. Given the trends in the pre-recruit estimates, low levels of recruitment will probably continue for the next two years.
- Population biomass, estimated to be 722 t (meats) in 2009, has increased over the estimate for 2008 (680 t) and is below the long-term median biomass of 787 t.
- The current interim TAC of 100 t for 2009/2010 is predicted to result in a decrease in the biomass of commercial size scallops for 2010. Similar to the other areas, the population model tends to overestimate biomass when projecting to the next year, though to a lesser degree. The actual decline in biomass in 2010 may be greater than predicted at this time.

SPA 5

- Landings in 2009 were 5.7 t against a TAC of 10 t.
- Commercial catch rates in 2009 decreased from 2008 and were below to the long-term median levels.
- The annual survey was discontinued as of 2009 in this SPA at the request of industry.
- The average catch of 9 t over the period 1997-2008 (excluding the high catch in 2004) have not led to marked increases or decreases in CPUE over that time, which would suggest a relatively stable population size at this level of harvest.

SPA 6

- Landings in 2009 were 90 t against a TAC of 140 t.
- Both catch and catch rates for Full Bay and Mid Bay fleets have been relatively stable over the last five years.
- Pre-recruits (40–64 mm) continue to be found in high concentrations around Campobello Island, south of the Wolves in SPA 6A, Duck Island Sound and, south of Grand Manan in SPA 6B. The main concentration of recruits (65–79 mm) coincided with the distribution of pre-recruits in the 2008 survey, being mainly found around Campobello and Duck Island Sound.
- Survey mean catch per tow for commercial size scallops has increased in all subareas of SPA 6 in 2009, although the increase in 6C may be partly due to limiting the survey to the areas around Campobello Island.
- Recent levels of catch do not appear to have resulted in a decrease in the abundance of scallops in the SPA 6 area as a whole.

Rationale for Assessment

As part of the Regional Science Advisory Process, a meeting was held 9 November 2009 at the Bedford Institute of Oceanography in Dartmouth, N.S., to review the 2009 scallop fishery and assess the status of the scallop stock in Scallop Production Areas 1 to 6 in the Bay of Fundy, as well as to provide the scientific advice for the 2010 fishery.

The Bay of Fundy scallop fisheries have a long and well documented history of peer reviewed assessments and the assessment approach has been accepted in previous advisory meetings. The focus of this year's assessment was on the assessment results and projections.

ASSESSMENT, CONCLUSION AND ADVICE

SPA 1 - Inner/Upper Bay of Fundy

SPA 1 covers most of the mid to inner Bay of Fundy. Since 2002, it has been managed as two separate areas: SPA 1A and SPA 1B (refer to detailed map on Page 14, Figure A1). The Full Bay Fleet can fish throughout SPA 1A and 1B. However, the other fleets are restricted to SPA 1B, the Mid Bay Fleet fishing only north of the Mid Bay line, and the Upper Bay Fleet fishing only east of the Upper Bay line.

SPA 1A - Southwest Bay of Fundy

Fishery

Landings were 267 t for the Full Bay Fleet during the 2008/2009 fishing year against a quota of 265 t (Figure 2). An interim TAC of 100 t was set for the 2009/2010 season based on the 2008 assessment advice. As of the Quota Cap report of 6 November 2009, 0.7 t had been landed from SPA 1A against this interim TAC.

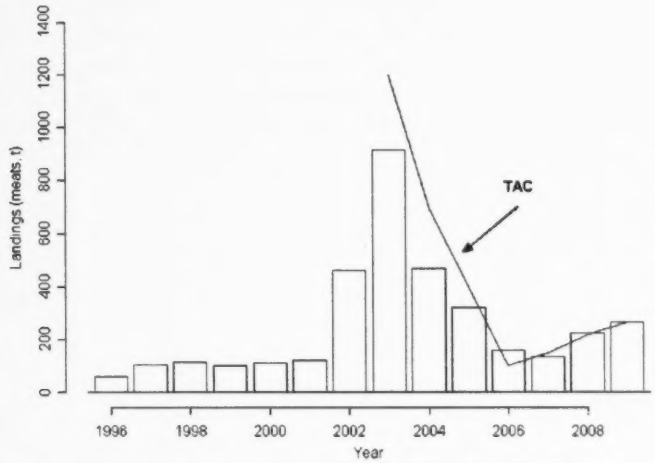


Figure 2. Scallop landings and TAC (meats, t) in SPA 1A.

Assessment

Catch rates declined from 2001/02 to 2005/06 as the strong 1998 year-class, which was mainly located in the 8 to 16 mile area, was fished out. The mean catch rate in 2008/2009 (16.34 kg/h) changed little from that in 2007/2008 (16.73 kg/h) and was above the long term median (1995/96 to 2007/08, 14.5 kg/h).

Since the 1998 year-class recruited to the fishery in this area, recruitment has been lower and the abundance of commercial size scallops has been fished down. Recruitment is expected at very low levels for at least the next two years. Survey indices for abundance and biomass of commercial size scallops in 2009 decreased from 2008 estimates by 23 and 28%, respectively.

The population model described in Smith and Lundy (2002) was applied to the combined survey biomass data for the three surveys in this area along with the catch data over the 1997–2009 period. Population biomass, estimated to be 1,299 t (meats) in 2009, was close to the estimate for 2008 (1,307 t) and close to the median biomass of 1,295 t (1997 to 2008).

Conclusions and Advice

Catches of less than 350 t for 2009/2010 should result in an increase in biomass for 2010 (Table 1). However, the model has a tendency to overestimate the abundance of commercial size scallop, and catches approaching this value may actually result in a decrease in biomass in 2010 (See Sources of Uncertainty section).

Table 1. Decision table to evaluate catch levels for 2009/2010 in terms of expected changes in biomass. Potential catches in 2010/2011 are evaluated in terms of the posterior probability of exceeding exploitation rate of 0.2.

2009/10		Catches in 2010/2011				
Catch (t)	% Change	Pr(exploitation ≥ 0.2)				
(exploitation)	Biomass	0.1	0.2	0.3	0.4	0.5
193 (0.14)	12.36	136	161	187	212	242
218 (0.16)	10.58	131	157	182	207	237
243 (0.17)	8.77	126	152	177	203	232
271 (0.19)	6.69	121	147	172	197	227
306 (0.22)	4.19	114	140	165	191	220
350 (0.25)	0.99	106	132	157	183	212

SPA 1B - Northern/Upper Bay of Fundy

Fishery

In 2007/2008, a TAC sharing formula for the three fleets in SPA 1B was implemented that allocated shares by the three subareas SFA 28B (excluding SPA 6), SFA 28C and SFA 28D (Figure 39). The total quota for all fleets in these areas for 2008/2009 was 385 t and total landings were 388.7 t. In the 2008/2009 season, the Full Bay Fleet landed 192.7 t against a total quota of 195.4 t over all three subareas (Figure 3). Landings for the Mid Bay fleet were 141.6 t (TAC 137.5 t) in total for SPA 28B and SFA 28C. The TAC for SFA 28C and 28D was 52.1 t for the Upper Bay fleet, and they landed 54.4 t in total for 2009. An interim quota of 100 t was set for the Full Bay fleet for the 2009/2010 fishery. As of the Quota Cap report of 6 November 2009, 2.09 t has been landed by the Full Bay fleet.

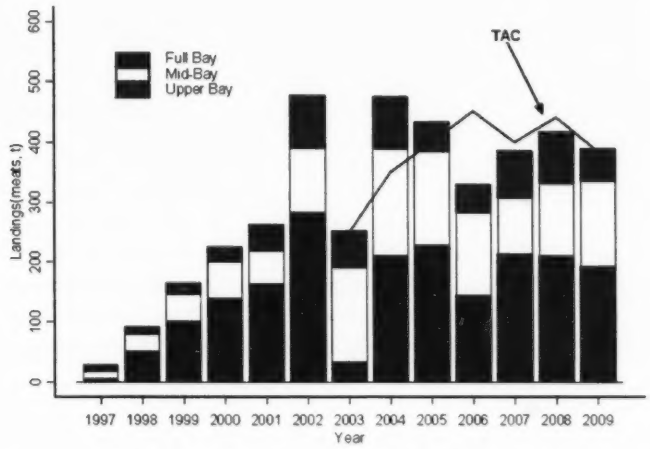


Figure 3. Scallop landings and TAC (meats, t) in SPA 1B (for all fleets). TAC for SPA 1B introduced in 2002.

Assessment

Commercial catch rates for the Full Bay and Mid Bay fleets in SFA 28B and SFA 28C in 2009 changed little from 2008, while Upper Bay and Full Bay fleet catch rates declined by 25 to 30%, respectively, in SFA 28D.

The year-class observed in the 40 to 64 mm range in the 2008 survey does not appear as strong in 2009 as it did in 2008. Overall, there do not appear to be indications of any strong year-classes that could recruit in the next two years; however, there are still higher than average local densities of recruits and pre-recruits in SFA 28C, that portion of SFA 28B adjacent to SFA 28C and Advocate Harbour in SFA 28D.

The 2009 survey mean number and biomass per tow for commercial size scallops indicates declines for all areas from 2008, except for the Outer stratum of SFA 28D and Scots Bay. While most declines in biomass and numbers were on the order of 12 to 20%, survey mean number and biomass decreased by close to 50% in the Advocate stratum.

The population model described in Smith and Lundy (2002) was applied to the combined survey biomass data and the catch data over the 1997–2008 period. Population biomass, estimated to be 1,703 t (meats) in 2009, has decreased from the estimate for 2008 (1,818 t) but is still above the median biomass of 1,672 t (1997 to 2008).

Conclusions and Advice

Catches for 2009/2010 of 430 t or less should not result in a decline in biomass for 2010 (Table 2). However, the model has a tendency to overestimate the abundance of commercial size scallop, and catches approaching this value may actually result in a decrease in biomass in 2010 (see Sources of Uncertainty section).

Table 2. Decision table to evaluate catch levels for 2009/2010 in terms of expected changes in biomass. Potential catches in 2010/2011 are evaluated in terms of the posterior probability of exceeding an exploitation rate of 0.2.

2009/10		Catches in 2010/2011				
Catch (t)	% Change	Pr(exploitation ≥ 0.2)				
(exploitation)	Biomass	0.1	0.2	0.3	0.4	0.5
270 (0.14)	12.03	193	225	254	285	320
299 (0.16)	10.53	188	220	249	280	315
329 (0.18)	8.92	183	215	244	275	309
364 (0.19)	7.14	177	209	238	269	303
405 (0.22)	4.95	170	201	230	261	296
430 (0.23)	3.67	165	197	226	257	292

SPA 3 - Brier Island, Lurcher Shoal, and St. Mary's Bay

Fishery

Although scallops can be found throughout most of this area, there are three main beds; those around Lurcher Shoal, below Brier Island, and in St. Mary's Bay. St. Mary's Bay (formerly SPA 7) was combined with SPA 3 for a combined TAC starting in 1999.

Total landings for the 2008/2009 fishing year were 62 t against a TAC of 60 t (Figure 4). An interim TAC of 50 t was set for October of the 2009/2010 fishing season, and 14.03 t have been landed as of the Quota Cap report of 6 November 2009.

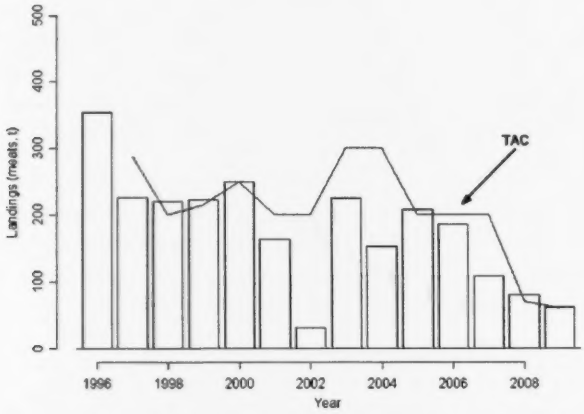


Figure 4. Scallop landings and TAC (meats, t) in SPA 3.

Assessment

Commercial catch rates have been stable and close to the median over the time series since 2007 while effort has been declining. Given that the fishery was concentrated in the eastern nearshore areas of SPA 3, where meat weights tend to be larger for a given shell height, it is possible that the 2009 catch rate would have been lower than observed had fishing occurred over the whole area.

Survey estimates of mean numbers per tow of commercial size scallops have been declining since 2004 while mean biomass per tow has declined since 2007. This decline has occurred despite decreasing fishing effort and is evident in both fished areas and in areas not fished since 2006. Trends in clappers have not indicated any recent increase in natural mortality. While higher than average numbers of small scallops in the 10 to 40 mm shell height range have been observed in the survey in the last three years, these scallops have not shown up as higher than average densities at larger sizes in the following years, and recruitment is expected to be low for at least the next two years.

A delay-difference model (Smith and Lundy 2002) has been used in past assessments to model the survey data and commercial catch in SPA 3. However, it was not used in 2009 to provide advice for the following reasons. The decline in the survey estimates (approximately 30% for numbers and biomass from 2008 to 2009) has been greater than expected given the catch. As a result, this year's version of the model increased natural mortality to be greater than 0.2 in recent years to account for the decline, even though there is no indication of such an increase in mortality in the survey data. In addition, biomass estimates have become unstable.

Conclusions and Advice

Commercial catch rates have been stable over the last three years for current catch levels but may only reflect stock status in the eastern nearshore areas of SPA 3. The survey data has indicated declining trends even in the areas that are not being fished. More work is required to reconcile these different trends.

SPA 4 - Digby

Fishery

The SPA 4 fishing season extends from October 1st to April 30th, with an extension in 2009 to May 8th. Total landings in 2008/2009 were 98.6 t against a TAC of 100 t (Figure 5). An interim TAC of 100 t was set for the 2009/2010 season based on last year's assessment. As of the 2009/2010 Quota Cap report of 6 November 2009, 63.02 t had been landed from SPA 4 against this interim TAC.

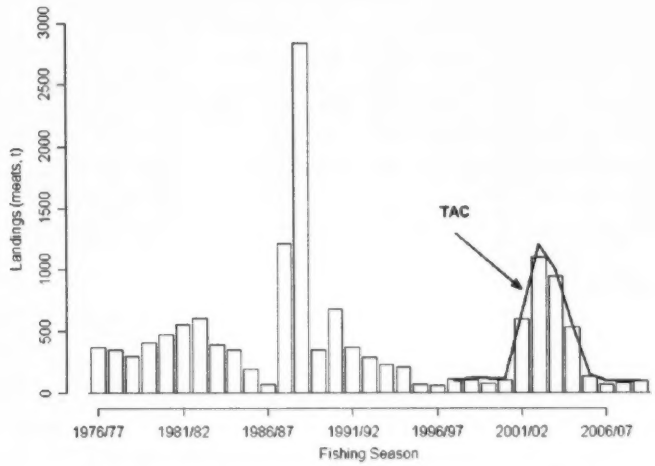


Figure 5. Scallop landings and TAC (meats, t) in SPA 4.

Assessment

Commercial catch rates declined after the above average 1998 year-class recruited to the fishery but have been either relatively stable or slightly increasing since 2005/2006. The 2008/2009 catch rate (18.8 kg/h) is equal to the long-term median (1976/1977 to 2007/2008).

Overall, the survey indices indicate that the population has been stable from 2006 to 2008 with low levels of recruitment, pre-recruits, and clappers. Survey estimates for mean numbers and biomass per tow of commercial size scallops indicate a decline of 21 to 27%, respectively, in 2009. Given the trends in the pre-recruit estimates, low levels of recruitment will probably continue for at least the next two years.

As in previous years, a delay-difference model was used to model the dynamics of the SPA 4 scallop population. Population biomass, estimated to be 722 t (meats) in 2009, has increased over the estimate for 2008 (680 t) and is below the long-term median biomass of 787 t (1983 to 2008). Note, that like other areas in the Bay of Fundy, the model tends to overestimate biomass when projecting to the next year (see Sources of Uncertainty section), though to a lesser degree.

Conclusions and Advice

The current interim TAC of 100 t for 2009/2010 is predicted to result in a decrease in the biomass of commercial size scallops for 2010 (Table 3). The actual decline in biomass in 2010 may be greater than predicted at this time.

Table 3. Decision table to evaluate catch levels for 2009/2010 in terms of expected changes in biomass. Potential catches in 2010/2011 are evaluated in terms of the posterior probability of exceeding an exploitation rate of 0.2.

2009/10		Catches in 2010/2011				
Catch (t)	% Change	Pr(exploitation ≥ 0.2)				
(exploitation)	Biomass	0.1	0.2	0.3	0.4	0.5
64 (0.10)	3.21	53	66	80	95	112
77 (0.12)	1.52	50	64	77	92	110
91 (0.15)	-0.26	48	61	75	90	107
106 (0.17)	-2.17	45	58	72	87	104
123 (0.20)	-4.35	42	55	69	84	101
144 (0.23)	-7.13	38	51	65	80	97

SPA 5 - Annapolis Basin

Fishery

The fishery in the Annapolis Basin (SPA 5) is only open to the Full Bay Fleet with the fishing season between January 1st and March 31st. In recent years, landings have varied between 2 and 20 t (Figure 6). Landings in 2009 were 5.7 t against a TAC of 10 t.

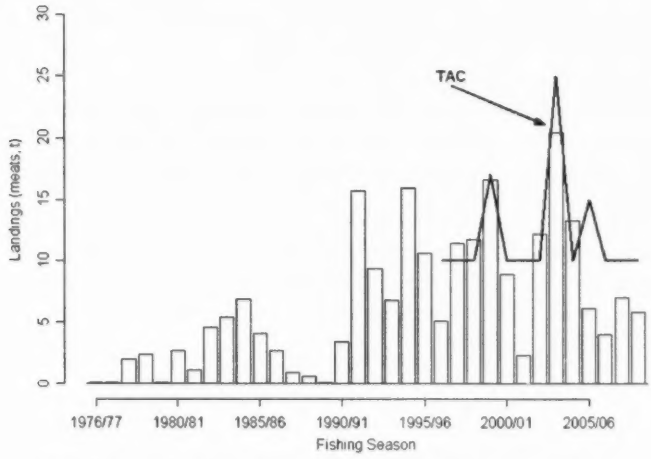


Figure 6. Scallop landings and TAC (meats, t) in SPA 5.

Assessment

Average commercial catch rates in 2009 (16.6 kg/h) decreased from 2008 (19.2 kg/h) and were below the long-term median levels (1977–2008, 18.9 kg/h).

The annual survey was discontinued as of 2009 in this scallop production area at the request of industry and the sampling effort was redirected to the other areas in the Bay of Fundy.

Conclusions and Advice

The average catch of 9 t over the period 1997-2008 (excluding the high catch in 2004) has not led to marked increases or decreases in CPUE over that time, which would suggest a relatively stable population size at this level of harvest.

SPA 6 - Grand Manan and Southwest New Brunswick

Fishery

The areas around Grand Manan and off southwest New Brunswick are designated SPA 6. This area is further divided into 6A, 6B, 6C, and 6D (see detailed map on Page 14, Figure A1). Landings to 6 November 2009 were 90 t against a TAC of 140 t (Figure 7).

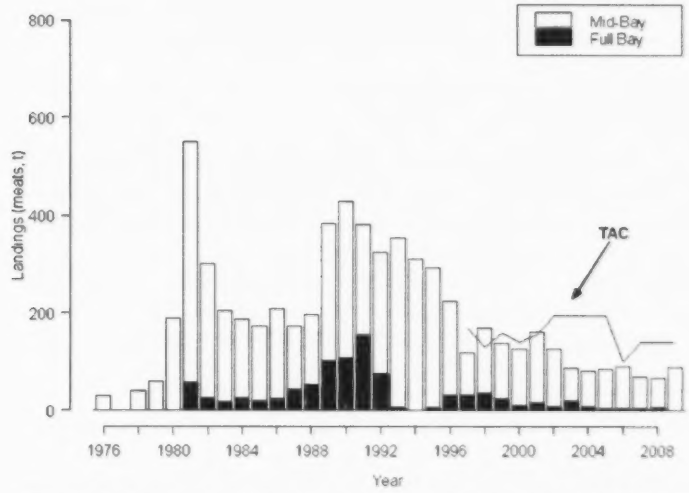


Figure 7. Scallop landings by fleet and TAC (meats, t) in SPA 6.

Landings by area for 2009 for the Full Bay Fleet were 0.3 t, 0.83 t, 0.2 t and 0.05 t for SPA 6 A, B, C, and D, respectively, against a TAC of 21 t. This fleet has not caught its quota for the last 6 years as it has directed its effort to the other scallop fishing areas.

The 2009 quota for the Mid Bay fleet was 119 t. Mid Bay landings for 2009 by area were 25.6 t, 23.5 t, 34.9 t, and 5.5 t for SPA 6A, B, C, and D, respectively.

Assessment

Both catch and catch rates for both fleets have been relatively stable over the last five years.

The number of survey stations in 2009 was reduced to 115 due to funding limitations. Survey tows in SPA 6C were concentrated near Campobello Island with 5 exploratory tows around the Wolves to monitor growth and distribution of the large numbers of small scallops (<55 mm shell

height) observed in the 2008 survey. Only one tow out of the five located high densities of these scallops, and they were in the 60 to 85 mm shell height range.

Pre-recruits (40 to 64 mm) continue to be found in high concentrations around Campobello Island, south of the Wolves in SPA 6A, Duck Island Sound and, south of Grand Manan in SPA 6B. The main concentration of recruits (65–79 mm) coincided with the distribution of pre-recruits in the 2008 survey, being mainly found around Campobello and Duck Island Sound. Mean catch per tow for commercial size scallops has increased in all subareas of SPA 6 in 2009, although the increase in 6C may be partly due to limiting the survey to the areas around Campobello Island.

Shell height frequencies for each of subareas 6A, 6B, and 6C indicate increases in all size ranges in the last two years.

Conclusions and Advice

Evidence from the Mid Bay commercial catch rates suggest that the abundance of commercial size scallops remains unchanged over recent years, while the surveys are indicating increases in 2009 relative to 2008. Recent levels of catch do not appear to have resulted in a decrease in the abundance of scallops in the SPA 6 area as a whole.

Sources of Uncertainty

The performance of the delay-difference model for evaluating the impact of the fishery in the past and for the upcoming season has been evaluated by comparing successive year's estimates of biomass from previous assessments. Biomass estimates from model fits to the data up to 2006, 2007, 2008 and 2009 are presented in Figures 8 and 9 for SPA 1A and 1B, respectively. Biomass projections to the following year are also presented. For model fits to 2006, 2007 and 2008, the biomass projections use the actual catch in the following year while the interim catch is used for the projection of the model for the data up to 2009.

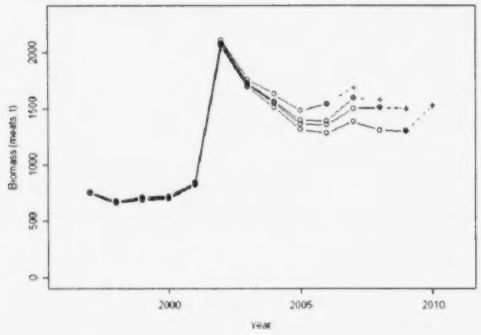


Figure 8. Comparison of population biomass estimates of commercial size scallops (≥80 mm shell height) from the delay-difference population model for data up to 2006, 2007, 2008 and 2009, respectively for SPA 1A. Predictions from the model for each run of the model are indicated by dashed lines and crosses.

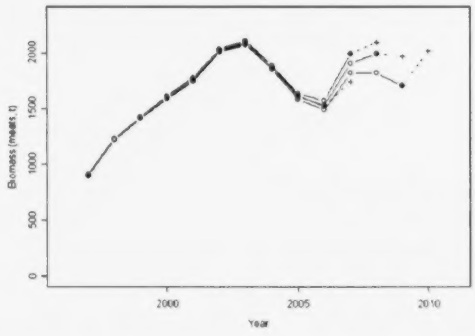


Figure 9. Comparison of population biomass estimates of commercial size scallops (≥80 mm shell height) from the delay-difference population model for data up to 2006, 2007, 2008 and 2009, respectively for SPA 1B. Predictions from the model for each run of the model are indicated by dashed lines and crosses.

Note that for both SPAs, successive biomass estimates for recent years tend to be lower than the estimates from the previous year's model. The differences between one year's estimate and the next appear to be more of a problem for the 2009 versions of the model.

These models use the survey estimates of commercial size and recruitment biomass as well growth coefficients, clapper data and the commercial catch to estimate direction and degree of change in the population from one year to the next. Successive revisions of the estimated biomass in a decreasing direction imply that the model is having difficulty balancing the decrease in survey biomass estimates from one year to the next with removals from the population through fishing and natural mortality. That is, the losses from the population due to catch and natural mortality in the current year cannot account for the proportional decrease in survey biomass and the model tends to lower its estimate of the previous year's biomass to be closer to the current year's biomass estimate.

In SPA 4, commercial catch rates have remained stable while survey abundance indices have declined. It is not presently known whether this pattern is a result of reduced efficiency of survey gear, potentially as a result of increasing distribution and density of lemon weed (*Flustra* sp.), or if commercial catch rate index is declining more slowly than abundance. This can potentially occur as a result of increasing gear efficiency or ability to target areas of high biomass. These differences could also result from reporting issues (e.g., unreported catch).

The failure of the model for SPA 3 this year also appears to be due to inconsistencies between the degree of decline in survey biomass estimates and removals from the population due to estimated natural mortality and catch. Problems may also be related to a mismatch between the broader survey area (i.e., covering much SPA 3) and the areas being currently fished (currently focused on nearshore waters).

A complete investigation of the models and data inputs will need to be conducted before the next full assessment.

OTHER CONSIDERATIONS

Some observer coverage was funded by DFO's Species at Risk Program for August 2008 - March 2009 for investigation of bycatch. No information from this program was available in time to be included in this assessment; however, it will be evaluated in the next assessment.

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APPENDIX 1

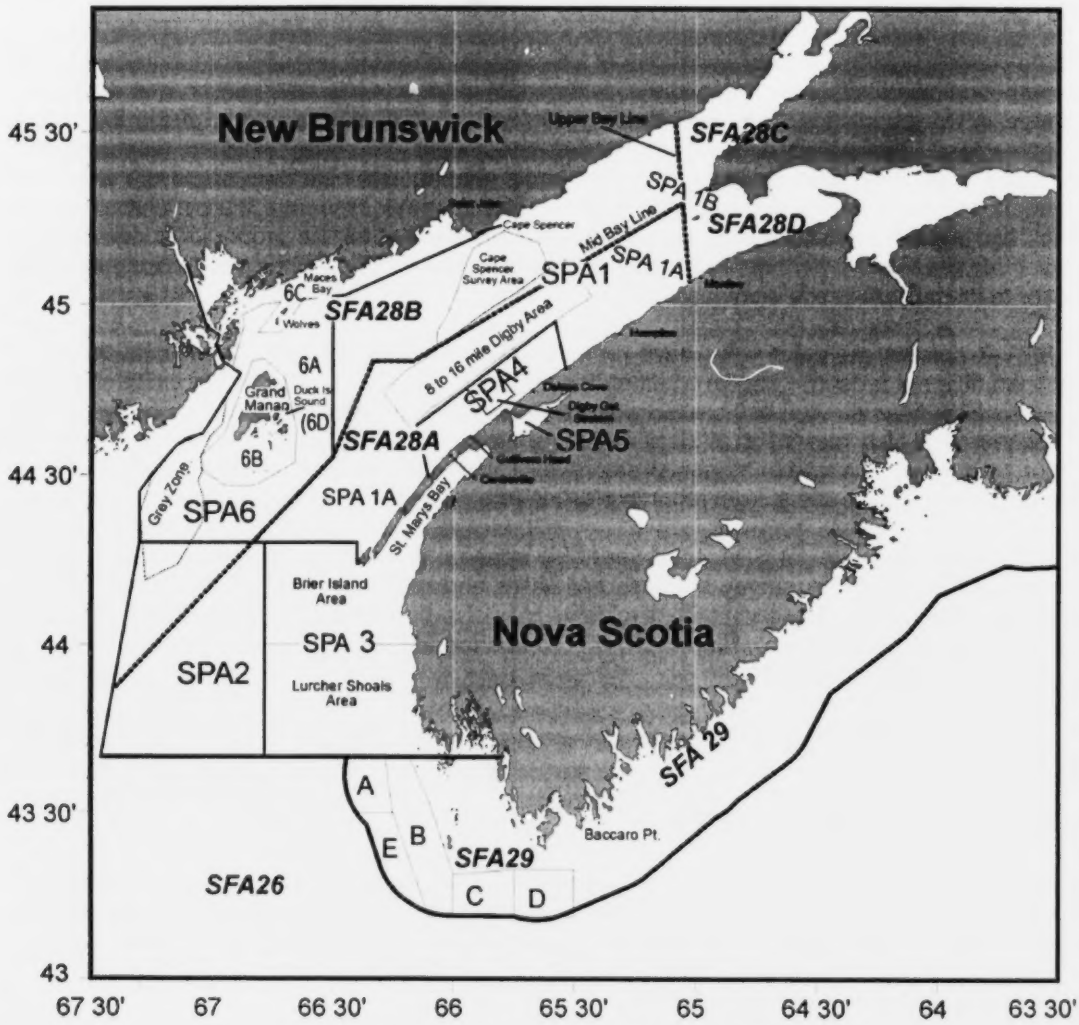

Figure A1. Locations and place names for inshore scallop grounds.

FOR MORE INFORMATION

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